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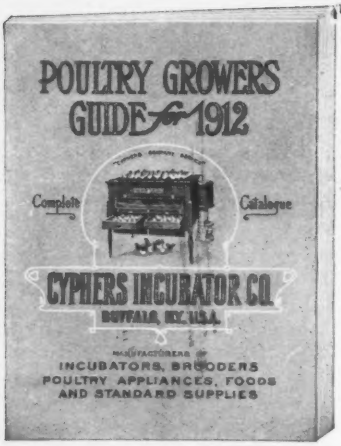

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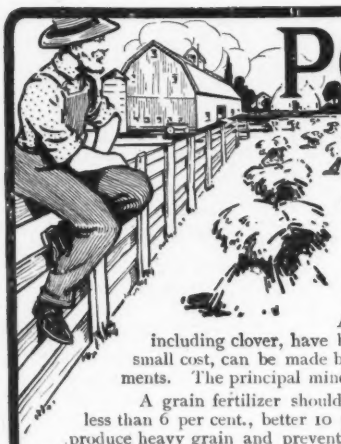

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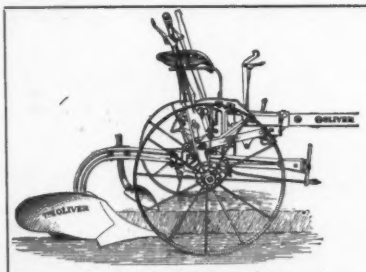

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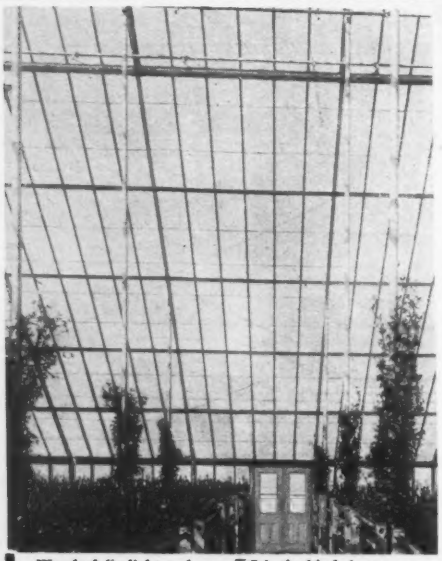

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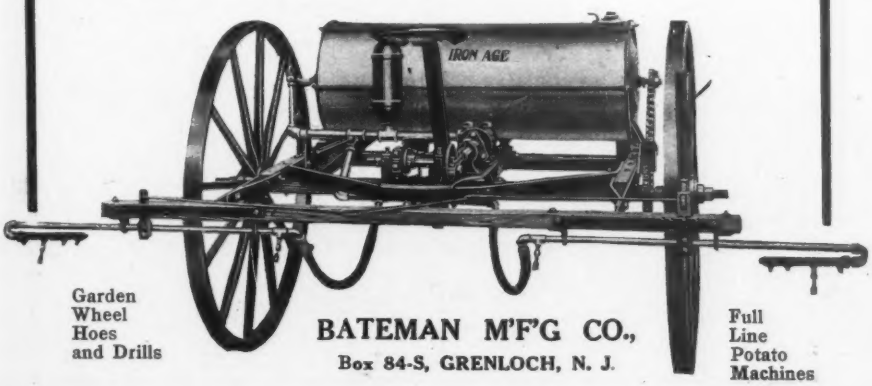

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GENERAL VIEW OF WHEAT BREEDING PLATS, CORNELL UNIVERSITY.

Courtesy of the Plant Breeding Department

The Cornell Countryman

Vol. 9 MARCH, 1912 No. 6

PLANT BREEDING

By C. H. Myers
Instructor in Plant Breeding, Cornell University

DURING the past ten years we have been reading and hearing much about the conservation of our natural resources. Both state and national officials have joined in their efforts to forward this great work. In the earlier history of the movement the resources considered were mainly forests, minerals, water power, etc. In other words, a large share of the talk about conservation, concerned only a very small portion of the resources. Now, however, we think of the soil as the great national resource, for from the soil must spring the sustenance for the nation.

At the present rate of increase, our population will be doubled in fifty years. The production of crops must keep pace with the increase in population or the development of the nation will be seriously hindered. During the preceding ten years the crop production of the United States has increased 20 per cent. For the same period the population has had an increase of 21 per cent.

There are three ways of increasing the total production of crops, viz.:

(1) Increased acreage; (2) better methods of tillage, including cultivation and fertilization; (3) better breeding.

Very little land in this country remains to be brought under cultivation. True, irrigation and drainage projects will increase the total acreage to some extent, but this will be inconsequential when compared to the whole. During the past ten years the total area of cultivated lands has increased only four per cent. in spite of high farm prices.

It is not the purpose of this article to discuss methods of cultivation and fertilization. These are highly important and deserve all the emphasis that is being laid upon them. The soil must contain an abundant supply of plant food and this should be kept in an available condition by proper systems of cultivation and crop rotation. However, this process of increasing yields by bettering the environment is an expensive one, especially when compared with the increase obtained by better breeding. At best an application of fertilizer is efficient for only a few years. But the force of inheritance is much stronger. In Hunt's Cereals in America may be found this striking statement concerning the importance of plant breeding: "Heredity, however, is a silent force, which acts without expense. If a plant be discovered that would produce because of the force of inheritance only one grain of maize more on each ear than at present, it would be capable of increasing the maize crop of the United States five million bushels of maize, not next year alone but for years to come. This is the significance of improved seed." It would seem that here, indeed, is a fertile field for work in the conservation of resources. These high yielding types of plants should be isolated and preserved for purposes of production.

Voltman, the eminent German agriculturist, is of the opinion that during

the last fifty years, the crop production of that country has been increased 25 per cent. by the introduction of improved seed.

The subject of Plant-Breeding is a comparatively new one and has undergone great development within recent years. The re-discovery of Mendel's Law in 1900 gave a new impetus to research work along the lines of heredity. The publication of De Vries epoch making *Mutations Theorie* has also had a stimulating effect. There are many problems that yet remain to be solved. The old questions of the inheritance of acquired characters, the accumulative effect of selection, and the origin of new species and varieties, are still disputed. But the working of the fundamental principles is well understood and the practical application of them is producing a decided improvement in many of our agricultural varieties.

There are two methods to be followed in the improvement of plants. One of these is hybridization, the other is selection. It would be hard to state which of these two methods has been productive of the greatest results. It is true that their effects cannot always be separated, for selection must be practiced to preserve and increase new forms brought into existence by hybridization. The technique required to perform hybridization work, to a large extent, takes it out of the hands of the layman, except in a very general and more or less inaccurate manner. On the other hand, the method of selection is open to every farmer who will but train his power of observation to discover new and valuable forms. These forms may be the result of natural or accidental crosses or they may be the mutations of DeVries, but no matter how they have arisen they can be made available only by selection and isolation. Hundreds of such instances might be mentioned in proof of this statement. Suffice it to say that the literature abounds with accounts of the production of new varieties by the selection of chance aberrant forms.

The federal and state experiment stations are naturally the leaders in agricultural experimental work, although many commercial organizations have done and are doing excellent work. It should be of interest to the readers of this magazine to know what the Department of Plant-Breeding at Cornell is doing along the lines of plant improvement.

One of the oldest and most import-

COMPARISON OF RIPE AND UNRIPE EARS PRODUCED FROM UNSELECTED SEED, CROP OF 1911. RIPE EARS IN THE PILE TO THE LEFT.

COMPARISON OF RIPE AND UNRIPE EARS FROM SELECTED SEED, CROP OF 1911—AFTER THREE YEARS OF SELECTION. RIPE EARS IN PILE TO LEFT.

ant lines of investigation is that with timothy. These experiments were begun in 1903, and are still in progress. The method of selection is the one that has been used, no pollination being performed other than enough to insure the purity of selected strains. The original planting included something like 20,000 individual plants, the seed for which was obtained from more than 230 places in the world. In this short account it is impossible to give the details of the experiment. These are to appear soon in a forthcoming bulletin; here the final results will be sufficient.

From the thousands of plants grown and studied some 200 different types or varieties have been isolated. Some of these are valuable types while others are of little use. Seventeen of the most promising ones have been increased, and tested for the last two years in comparison with plats grown from good, commercial seed. All of the plats are of a uniform size and all receive exactly the same care and treatment. Every fourth plat in the series is grown from commercial or check seed. The summary of the results of this year's test appears in Table I.

This gain of 1.5 tons per acre is larger than the present average yield of the state. It is not unreasonable to expect that the total production of timothy in New York State will increase decidedly as soon as these varieties may be generally distributed.

TABLE I

COMPARATIVE YIELD IN TONS PER ACRE OF 17 NEW VARIETIES OF TIMOTHY AND TIMOTHY GROWN FROM ORDINARY COMMERCIAL SEED

	Yield
Average 17 new varieties crop 1911...	3.5
Average commercial seed crop 1911...	2.0
Difference	1.5

Some interesting and valuable results have been obtained in the breeding of corn. Increased yield and maturity are the things to be attained. This work is carried on mainly in coöperation with practical growers. Only one instance will be cited to show the result of this work, for in a general way the same result has been obtained in different parts of the state where the experiments have been conducted.

A breeding plat for increased maturity has been conducted upon the farm of Mr. G. R. Schauber at Ballston Lake. The seed for the beginning of this experiment was a western dent known as Funk's Ninety Day. In the first year's test only 13 ears out of every hundred came to maturity. In

1911, after three years of selection from these matured individuals, 72 ears out of every hundred ripened. These results are shown graphically in Plates I and II. In each of these pictures the pile of corn to the left is made up of the ripe ears from five breeding rows, while the pile to the right is made up of the unripe ears. Plate I represents the original unselected seed, while Plate II represents the selected seed for 1911 or the third year's result. In this test the two lots were grown side by side.

HARVESTING OAT HYBRIDS AND SELECTIONS, CORNELL UNIVERSITY.

TABLE II

COMPARISON IN YIELD OF NEW HYBRIDS AND SELECTIONS WITH ORDINARY COMMERCIAL VARIETIES OF OATS

	Two year average yield bushels per acre
10 best hybrids	59.0
10 best selections	58.1
8 best varieties	50.8

In the breeding of oats both hybridization and selection have been practiced. Crosses have been made to produce new forms and selections of already existing forms have been made. In Table II will be found a summary of a two years' test of these new varieties in comparison with the ordinary commercial variety.

The work in wheat breeding is being carried on in much the same way as is done with oats. As yet the work has not gone far enough to draw definite conclusions, although many of the selections are giving substantial gains over the commercial varieties. These gains range from three to eight bushels per acre.

Experiments in potato breeding are being conducted to prove the efficiency of hill selection. Excellent results are being obtained by the selection and propagation of individual tubers having a large yielding capacity. The comparative yield from the stem and seed end has been tested. As an average of 22 varieties for two years, the seed end gave a yield of 180 bushels per acre, while the corresponding yield for the stem end was 151 bushels per acre.

In addition to the crops mentioned above, experiments are being started

with buckwheat, clover, peas, and beans. This work is only in its infancy and no definite results are yet available. It is believed, however, that the same general principles which have been effective in the improvement of other crops will apply in the case of these.

In the above crops only the work which is of immediate practical application has been mentioned. Many other questions are being investigated as, for example, the relation between various physical characters and the yielding capacity of the plant; the occurrence of natural crossings in normally self-pollinated plants; the effect of poor and fertile soil and different conditions of moisture, light and heat upon the growth of plants and the inheritance of such variations as may be caused; the possibility of producing new forms by external stimulus, such as the injection of chemicals; the variability produced by hybridization; the relation between root development and the productive power of plants.

Liberty Hyde Bailey, Senior

LIBERTY H. Bailey, father of Dean L. H. Bailey of the New York State College of Agriculture, died at his home in South Haven on January 16th, at the age of ninety-two. The history of his deep, rich, far-reaching life would cover many pages. Something of his personality, strong and positive, may be presented briefly.

In Mr. Bailey's presence one was always conscious of his splendid physique and dominant spirit, of his fitness for leadership. He was tall, rugged, powerful, keen, restless—characteristics that made possible the pioneer who was to help transform a wilderness into a progressive, thriving section of the middle west.

Both friend and stranger recognized that Mr. Bailey was a man of much reserve; but the spontaneity that could not always be controlled occasionally revealed the depth and tenderness of his soul. He was a silent man always, but when he spoke his words carried weight. He terminated many a rambling discussion in a short decisive way. He was well able, however, to give that silent companionship which was so full of meaning to all who understood it.

Mr. Bailey showed very marked public spirit. He had the creative mind and decision of character that enabled him to promote and develop many interests in his community. He made contributions to the press; took an interest in the school children, and in the young men and women of his neighborhood; labored ceaselessly in the interest of Masonry that others might find the personal growth through the organization that he had found; and stood positively and fearlessly for the democratic party.

Mr. Bailey did much to promote civic pride in his home town. He encouraged the planting of trees and on one occasion offered to give trees for arbor day to school children making request for them. He expected to be asked for a few only, but when the call came for several hundred he made good his offer. At this time he was past eighty years of age. Bailey Avenue, well known to all living in the neighborhood of South Haven, has two rows of stately maples extending a quarter of a mile along the highway, which were planted by Mr. Bailey when he first established his home sixty years ago. It is a fitting memorial of the man, dignified and enduring.

With reverent spirit one contemplates this man's life. Bravely starting out in young manhood to find life and having found it, giving of it generously and wisely for over half a century; meeting responsibility to home and family, to community and to state; such was Mr. Bailey's contribution to the world, and we who knew him do not wonder that with cheerful heart he was, to use his own words: "Ready and waiting to cross the Great River."

A. G. McC.

COÖPERATIVE MARKETING

By Lloyd S. Tenny

Formerly connected with the United States Department of Agriculture at Washington, D. C.

[A speech delivered before the members of the New York State Fruit Growers' Association at their annual meeting in Rochester, January 4, 1912.]

MAN should be ever striving to better his condition. A dangerous point has been reached in the life of any individual, of any community or of the nation itself, when such an individual, community or nation sits back and says "I am satisfied."

The law applies to New York State fruit-growers. When we think there is nothing new for us—that we have reached the very pinnacle of perfection in our methods of growing fruits and in harvesting and putting them on the market, just so soon are we opening wide the gates to permit someone else to out-distance us. We must be awake to the conditions, both to strengthen still more our strong points, and to replace our weak points with stronger and more up-to-date ones.

Coöperative fruit marketing is an established fact. It is no idle whim of some theorist. It is so well established and the principles on which it is based are so clear cut and well understood that it is well within the bounds to say that any community where coöperation is not practiced is backward to that extent. I feel safe in saying also, and doubt if anyone will question the statement, that any locality now without coöperation will be improved by the development of a good coöperative organization. This improvement will be along financial lines—the farmers will make more money—but it will not stop there alone. Social conditions will be improved. Better schools will be maintained. Libraries, reading-rooms, etc. will be established: in other words, there will be better rural conditions. The farm will be more attractive, and the farmer boys will stay there and the city fellows will want to come there to live.

The purpose of this paper is first of all to stimulate a desire on the part of you fruit-growers of New York to know more about coöperation. In the second place I hope we may discover some of the principles which underlie successful coöperation. Looking at the reverse side we may see some causes for failure. In the last place we shall try to point out what we fruit-growers here need and how these ends may be accomplished.

Coöperative fruit handling has reached its highest type in several of the western states. This is not because it happened so, but the growth there has been based on certain well defined principles. Many of the circumstances which encouraged the development of coöperation in the West are not present here in the East, so we would not expect this early development to take place here. As early as 1899 a western author writing upon the subject of the farmer as a coöperator says:

"Coöperative business is increasing yearly from natural causes. It is well, therefore, to understand precisely what it is.

Coöperation is the union of those of like interests for the purpose of more effectively competing with those of adverse interests. The simplest cooperative enterprises are those for the sale of products of their members. The fundamental idea of marketing societies is the highest attainable prices for their products."

The above quotation strongly implies at least that coöperation was first developed in order to compete with those interests which to a greater or less degree were competitive. To a certain extent of course this is true. But the history of coöperation in this country shows that in a great measure, farmers have united in order to overcome circumstances as well as to com-

pete with other interests. Thus, we find the farmers of Southern California uniting in a coöperative movement to bring in water for irrigation purposes long before they unite to sell their products. Then, too, their great distance from the large markets of the country, practically compel a united movement in marketing their fruit, since it was almost a hopeless thing for a grower of any small or medium acreage to try to market his fruit when he was 3000 miles away from his buyer. From the very nature of events co-operation was forced upon the growers of California and other Western States. We used to have a little saying in our office at the Department of Agriculture in Washington, which at first seems rather strange and yet as you think of it the truth of it appeals to you more and more. I give it to you; "In the end a section or district is fortunate in proportion to its natural disadvantages." Thus the deserts of Arizona and California, which by nature are waste places, come to be almost gardens of Eden when the irrigation waters are turned upon them. With the ditches full of water, the fruit-grower of that section is almost independent of the rainfall. He waters his crops when they need it, and withholds the waters as he wishes. So the long distances, which lie between the West and the East with corresponding large freight charges, almost compel good methods of packing, for what shipper can afford to run the risk of forwarding fruit poorly packed. So, again, these very phases; these natural conditions, which in the beginning were counted great discouragements, have all united more or less to bring about the great coöperative organizations to which the Western States may well afford to point with pride.

These things, however, do not entirely account for this coöperative movement. There are two other factors at least which have had great weight in developing and greatly encouraging the movements in the West. Fruit-growing there is a highly specialized industry. When once water has been brought to a locality, and the heavy expenditure of money made, it puts a price or valuation upon every acre of land, irrigated by that canal, which almost compels intensive farming. No man can afford to allow his ground to lie idle or produce half a crop. The result has been certain districts, more or less independent of each other, have become almost entirely devoted to the growing of a certain crop. Hence, we have the Riverside District or the Redlands District, with pretty much every farmer growing citrus fruit—oranges or lemons. Here, there is thus a community interest. They must stand or fall together. Ideal conditions, as you see, for coöperation to start and thrive.

Here in the East, farming is more general. Fruit-growing is but an incident in the life of the farmer. It is only occasionally and this but recently, that we find a locality here where even most of the farmers are interested in the same crop. It is diversified farming—not good conditions to develop coöperation.

There remains at least one other factor which has had a great weight in the development of coöperation in fruit handling—the type of man who grows the fruit. For years back men from the East have been going West. For reasons which may be hard to analyze, some in almost every locality went and some remained behind. The very fact that a man went West indicated that in some way he was different than the fellow who stayed East. Wasn't it the man who was attached to the old home ways and home things who usually stayed? Didn't the boy who easily mixed and mingled with the others, the boy who was progressive, ready to try something new usually end up by going out west—to Michigan, Illinois, Iowa, Kansas and then on across the mountains to California. Wouldn't this process carried on for a couple of generations tend to leave behind here on the eastern farms a type of farmer with extreme conservative tendencies. I am not finding fault with him. He probably was

more of a balance wheel for the country than the ones who went west. But really can't you see how from the very nature of events, you couldn't expect our eastern farmers to develop coöperation ahead of the western fruit-grower? This distinction between the eastern and western fruit-grower became more marked a few years ago, when it became a popular thing for the rich men of the eastern cities to go west to invest in fruit lands. The attractive climate, the healthfulness, that strange something about owning an orange grove, lead many men, who were successful in business here to invest money there and go there to live. These men were trained in coöperative methods. They understood the value of coöperation and they became the leaders in uniting the fruit growers.

I have dwelt long on this introductory part; but right here lie many of the principles of successful coöperation.

There Must Be Some Common Ground of Need.

If everybody is satisfied, they are pretty willing to leave things as they are. Let good enough alone as it were. This isn't saying that things might not be improved by a change. But it is difficult to bring about any change unless there is some discontent.

The orange growers of California about 1890, were up against a difficult situation. Their groves had come into bearing, but their real markets were here in the East. It is true that buyers and commission men went out and bought their fruit, but the prices were so low or the consignments gave such poor returns, that after paying the charges for harvesting, packing and shipping, little, if anything, was left. It was not an uncommon thing even for the shippers to have to advance money to pay the freight. Probably many of the buyers and handlers were dishonest men, but even if they had not been, it would not have been possible to handle their crops at satisfactory prices. There was poor distribution by this method. Probably the city of Rochester didn't have a buyer in California, and it is doubtful if any commission house here was receiving many carload shipments. The same was true of hundreds of places of this size and smaller. The same thing has been true in Florida in much more recent years. With thousands of buyers and solicitors in the state, and practically all of them from just a few large cities, it was impossible to get wide distribution. Let the price of oranges go up to 25c per box in Philadelphia and a hundred cars might be shipped to that point the following day, with what success you can easily guess.

So about 1890, we find a common ground of need in California for a coöperative organization among the orange men. Prices were not satisfactory, so there was formed at a little suburb of Riverside the Pachappa Fruit Association. The original idea was a compact among the growers to hold their fruit until all sold at one time. They found this was unsatisfactory, so afterwards they undertook their own shipping. The attempt was a failure. It failed largely because of one thing, namely, the association was not an incorporated body.

The Association Must be an Incorporated Body

After several unsuccessful attempts to unite the orange growers a mass meeting was held in March, 1893, at the village of Colton. Here was outlined a place of a fully incorporated organization. It was the beginning of success. From this small beginning there has grown an organization with over 5000 members which distributes from 10 to 15 million dollars worth of fruit a year, and in five years has handled for the farmers of southern California the immense sum of 50 million dollars with a loss less than five thousand dollars from uncollected debts; a record which probably cannot be equalled by the Standard Oil Company, the Steel Trust, or any other organization handling that sum of money. We may well afford to take off our hats to such a bunch of fruit-growers.

(To be concluded in April number.)

BACTERIOLOGICAL ANALYSIS OF MARKET MILK

By W. A. Stocking
Professor of Dairy Industry at Cornell University

OUR knowledge of the rôle which bacteria play in the various fermentation changes which take place in milk began in 1860, when Pasteur showed that certain forms of bacteria were associated with the common phenomenon of the souring of milk. For some years following this discovery but little attempt was made either in this country or abroad to go further into the field to which Pasteur had opened the door. This was doubtless chiefly due to the very unsatisfactory methods then known for the study of these minute forms of life, and it was not until the discovery by Robert Kock in 1881, of the method of plating into solid media that the way was really prepared for a study of the relation of bacteria to the changes occurring in market milk. Up to this time bacteria had been studied in liquid media only, and it was not possible to determine the number of organisms in any given substance. Kock's discovery made it possible to determine, at least approximately, the number of organisms present in any lot of milk, and also to get certain data regarding the species, which formerly could not be obtained. The first attempt to study the bacteria in market milk appears to have been in 1885 when Von Geuns studied several lots of milk sold in Amsterdam and reported the number of bacteria found per cubic centimeter. This was followed in 1888, and 1889, by Clauss who made bacteria counts of eight samples of milk sold in Würtzburg. He found that the different lots of milk varied in bacteria content between about 200,000 and over 3,000,000 per cubic centimeter. Cnof in 1889, and Renk, in 1891, also made counts of milk sold in Münich and Halle. In some of the latter samples the number of bacteria were found to run as high as 30,000,000 per cubic centimeter.

In this country investigations in dairy bacteriology began with the work of Conn in 1897, and the first effort to study the bacterial content of city milk appears to have been in 1891, when Park made bacteria counts of the milk sold in New York City. The next year Sedgwick made similar studies of the Boston milk supply. This was followed by similar work by Frye in Buffalo in 1896, and by Goler in Rochester in 1899. These early examinations of the city milk revealed the fact that the sanitary quality of milk coming to the cities was not always what might be desired. The very high numbers of bacteria found was a great surprise to these early workers, and in view of the importance of milk as a food, especially for young children, it was believed high numbers of bacteria were undesirable. It was also believed that they indicated unsanitary conditions and lack of proper care in the production and handling of the milk. Out of this early work has grown our present country-wide movement for a cleaner, more sanitary milk supply.

The methods used for the bacteriological analysis of milk vary widely in different places both as to the technique employed and the interpretation of the results obtained. This is natural in any new line of scientific work. In some places the sanitary quality of the milk is judged on the total number of organisms present, while in others the total count is not considered important but the species present are regarded of the greatest significance. In stiill other places the milk is judged both on the basis of the total count and the different species or types of organisms present. It is believed that the number of bacteria present in any given lot of milk is a fairly accurate index of the conditions and care under which the milk has been produced and handled,

while the presence or absence of certain groups or species indicate the occurrence or freedom from certain pathological conditions in the cows producing the milk. During the past few years much valuable work has been done on methods for bacteriological analysis of milk and those now in use are rapidly becoming standardized.

In some cities a definite numerical limit has been set (as for example, 500,000 per c. c.) and an attempt is made to exclude from sale, milk showing a higher bacteria count. In other places an effort is made to improve the general supply by grading up the poorest supplies as rapidly as existing conditions will permit.

There is still some difference of opinion among dairy bacteriologists regarding the value of bacteria standards for milk. The germ content in any given milk is dependent chiefly upon three factors; its initial contamination or the number of organisms getting into the milk at the time of production; the temperature at which the milk is kept; and the age of the milk when the analysis is made. A high count may be the result of any one of these conditions or a combination of two or more of them. If milk contains a large number of bacteria, it indicates that there has either been carelessness in its production, giving it a high initial contamination, or the original organisms have been allowed to grow, either as a result of too high temperature or of age. On the other hand if milk contains a small number of organisms, it shows that the number getting in at the outset was small and sanitary conditions were therefore good; also that it has been held at proper temperatures to prevent their rapid development.

MILK AS SEEN UNDER THE MICROSCOPE.
a, bacteria; *b*, fat globules; *c*, pus cells or leucocytes.

While the germ content of milk may be considered as a general index to the sanitary care it has received, it may not always indicate its wholesomeness for high counts may result from the very rapid growth of the lactic acid bacteria, in which case the milk may be perfectly good and wholesome while in another sample, having a much smaller number of organisms, there might be certain pathogenic species which would make the milk decidedly dangerous. The sanitary conditions of production and handling may be indicated by the total bacteria count, but in interpreting the results of such analysis great care should be used in order to guard against errors. The bacteria count has its value but at the same time its limitations.

Under some conditions a direct microscopic examination of the organisms found in milk is of much value in determining its wholesomeness, since in this way certain types of organisms, such as *pus streptococci* and members of the *Bacillus coli* group, leucocytes, etc., may be recognized. The presence and relative numbers of these different groups serves to indicate the existence of certain forms of disease in the cows which produce the milk.

There is a strong tendency at the present time to combine the plating and direct microscopic methods for bacteriological analysis of market milk, and such results in the hands of a careful worker are of great practical value in controlling the quality of a city's milk supply.

The practical value of this work is well shown in the decreased sickness and mortality, especially among the children in the cities where the milk supply is under careful bacteriological control.

SOME THINGS OUTSIDE THE FARM-YARD GATE

By Fred W. Card, '92

THE American farmer is a busy man. No man who is not a farmer realizes the full truth of this statement. The duties he owes to his family and his farm leave him little time or inclination to consider the duties he owes to his fellow farmers and to the community at large. But no man has a right to shirk these duties. They may vary with time and circumstances but they are ever present and ever offering their opportunity for service and usefulness—that service which alone measures true success in life.

It may often be the duty of the farmer to coöperate with his fellow farmers in the business management of the farm, in buying and selling, in the ownership of improved sires or expensive equipment and in farmer's coöperative organizations. There always lies before him the duty of interesting himself in questions of public policy in the problem of good roads, of rural trolleys, in farm telephones and similar matters of public welfare. His interest in good roads should not limit itself to urging appropriations for state roads at great expense and unnecessary waste of public funds. These roads as now built cost too much money, benefit too little farm property, and what is of greater importance, are too short-lived and far too expensive to maintain. When the road is completed, the expense is only begun. If the road problem is to be solved in a way to be of most service to the farmer, it must be done in a way which will improve roads at less expense with better returns for the outlay.

This suggests the matter of more business-like expenditures of public funds in all lines. Unfortunately men have grown accustomed to a different standard of business methods and even of morality in public affairs from that demanded in private affairs. The burden of taxation on farm property grows more heavy as the years pass and the farmer has reason to feel that he does not receive the just equivalent for his money. Every man should make his influence felt for greater economy of administration of public affairs not in the niggardly sense of refusing to spend money where it is needed but in the way of demanding a better return for what is used.

What shall be the future of the American farmer? Many have asked this question but none can answer with authority. Future history alone can tell. The outcome will depend on many things. First among these will be the financial returns which the American farm can be made to produce. Unless these returns are sufficient to afford the conditions needed for a life of intelligence and usefulness it is idle to hope for a future farmer of high ideals and noble aims. Hence the wisdom of all agencies which make for better and more profitable farming. The farmer must be able to command all the reasonable comforts of life with sufficient leisure to furnish normal mental activity, if he is to take the place he ought to take in the future of our nation. The social and intellectual life of the country must be such as to appeal to young men and women of intelligence and character if the drain upon the best life of the country to supply the needs of the city is ever to be stemmed. Economic laws will prevail here as in other things.

It is idle to seek to keep young men and women on the farm if other callings offer substantially better inducements —inducements which are genuine and not deceptive. It is further unwise to keep young men and women on the farm in large numbers if the economic balance demands their services elsewhere.

As the future of the American farmer depends on financial returns, the home life, social life and the intel-

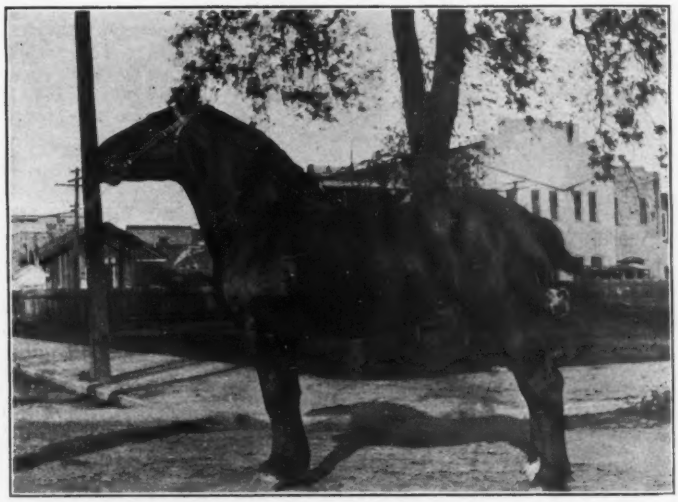
lectual life which the farm is able to offer, so are these dependent in turn upon the influence of other agencies chief among which are the home, the school and the church. The future of your child and of mine is determined far more by the atmosphere of the home of the child than by any other agency. Dollars are needed to make the ideal home but they are the least important factor in it. The attitude of the parents and the influences at work in that home outweigh all other considerations. But the influence of the school will count for much. So long as that school disregards the things of the home and the farm, so long as the influence of the teacher and the text points in other directions, whether consciously or unconsciously so long will the rural school fail in its duty to rightly shape the future of the American farmer. The church, too, is learning that it has a part to play in the solution of this great problem. It is coming to lay more stress upon teaching men how to live and less upon fitting them to die. If the American farmer of the future is to be the man he should be, he must be a successful farmer, a man of intellect, and a man of character. The country church should give him help in trying to become all these things. It should interest itself in the problem of better farming as well as in the problem of better living. Upon the educated farmer more than others, because of his better training, rest the duties to the farming community and to the commonwealth. Likewise to him swings wide the door of opportunity for usefulness and service in things outside, as well as inside the farmyard gate.

HORSE RAISING IN NEW YORK

By J. C. Otis, '12

ANY farmer visiting one of our large cities for the first time cannot fail to be impressed with the great number and variety of horses which he sees on the streets. If he visits the horse markets of New York or Buffalo, where hundreds of horses pass under the auctioneer's hammer daily, he will be even more impressed. He may wonder where all these horses came from and where they are going. If he inquires, he will find that they did not come from New York. They are shipped in by the carload from the Central West and their production nets those who raise them a handsome profit. The questions naturally arise: Why are not these horses produced in New York State? Why cannot the New York farmer reap some of this profit as well as the farmer of the Central West?

It is true that some horses are produced in this state but few of them ever reach the big city markets. The majority remain on the farms. The reason for this is apparent when we consider the type of horses which the market demands and the type of our home grown horses. Of 17,000 head that passed thru one of the large markets a few years ago, 15% weighed less than 1200 lbs., 15% weighed more than 1500 lbs., leaving 70% weighing between 1200 and 1500 lbs. From these figures we see that the market demands horses weighing between 1200 and 1500 lbs. and containing considerable draft blood. Of course there is always a limited demand for coach and driving horses but this type are used mostly for park driving by wealthy people, so only horses of first class merit will find a sale. Now if we look at the common horse stock of the state we will be impressed with the prevalence of trotting blood in them. To be sure we produce some very good horses, but the great majority are little animals, without speed enough for race horses, style enough for coach horses, or weight enough for draft horses. With the increased use of heavy machinery, they are not large enough for the most



"CORPORAL" CORNELL UNIVERSITY FARM. A GOOD TYPE OF PERCHERON FOR FARM USE.

efficient use on the farms and it is difficult to dispose of them at profitable prices. They may do very well to pull the grocer's wagon but it is not a profitable enterprise to raise horses for that purpose.

In horses as in everything else, it is the lower grades which first suffer from over-production. First-class horses will always bring good prices because they are always scarce. A few years ago when there was a great over supply of horses, the price of those of only average quality fell very low but the price of first-class horses was not appreciably affected.

Not many years ago we were told that we would soon be living in a horseless age. As a matter of fact there are now more horses in the United States than ever before, and the value per head is greater. Since 1909, the value per head has increased $12.55, and the number has increased from 19,747,000 in 1907, to 21,040,000 in 1910. Of these 750,000 are in New York State. On Jan. 1, 1911, the total value of horses in the United States was $2,276,363,000 and in New York State over $81,500,000. A comparison of the total value of horses with that of the combined value of cattle, sheep and swine is significant. In the United States the total value of cattle sheep, and swine is $2,113,600,000 —$162,763,000 less than the value of horses alone. Evidently the horse is still a factor to be reckoned with in the wealth of the nation. It is safe to say that in our time at least, the heavy draft horses will never be driven from the city streets and the farms, or the coach and driving horses from the city parks. No one then need fear an over-production of first-class horses.

Now is there any reason why New York State cannot profitably produce horses of this type? If we study the conditions we find that New York is particularly well adapted for horse raising. The blue grass pastures of Kentucky are famous the world over for the high grade of horses which they produce, but we are told that Kentucky Blue Grass might just as appropriately have been named New York Blue Grass and that in most parts of the state we can have as good blue grass pastures as are found anywhere in Kentucky.

If we study the famous horse-producing sections of the old world

such as the Clydesdale region in Scotland or La Perche, the home of the Percheron breed in France, we will find that they are localities with a cool, moist climate and a stony or calcarious soil. A cool climate with fairly high altitude seems to be necessary for the proper lung development, so necessary in the horse. We have these conditions in New York State. The invigorating effect of our climate is seen in the greater hardihood of our native horses as compared with those shipped into the state.

The soil is no less important than the climate in producing high quality horses. Western horses, grown on the soft plains are greatly troubled with hoof ailments when brought to the cities. On the other hand, colts which have run all their lives over our stony eastern pastures develop hoofs better able to stand the wear and tear on the hard pavements. Besides this mechanical effect on the hoofs of the horse, the soil is very important in the relation that it bears to the mineral content of the plants which the horse eats and the water which he drinks. A calcarious soil is very necessary to the proper bone development. The soil in many parts of the state is calcarious and in nearly all parts of the state there is enough limestone in the sub-soil and underlying rock to make the well water sufficiently rich in lime.

The nearness to the great horse markets is another great advantage to the New York horse raiser. The cost of transportation is less and there is less danger of loss in shipping a short distance. Many valuable horses are lost or injured in making the long trips from the West. Furthermore, all Western horses have to become accustomed to our climate and are often sick and feverish for a long time after reaching their destination. With New York grown horses this risk is cut out.

The cheapness of much of our land is also an important point to be considered. The price of land in the Central West is much higher than in New York. This gives us an advantage. If we can get the same price for our horses, the interest on our money invested in land will necessarily be greater.

With all these natural advantages it will pay the farmers of New York State to make use of them. We have all the requirements for a successful horse raising country. A little effort on the part of the farmers could make of New York State a horse raising region famous the world over.

A GOOD SIX-HORSE TEAM.

FARM EFFICIENCY

By James G. Dudley
Consulting Engineer, New York City

[EDITOR'S NOTE.—We are glad to be able to publish from the urban viewpoint a few ideas regarding the organization of the rural population in order that they may meet successfully the well organized urban population.]

"BACK to the farm" is now a recognized national slogan for Uncle Sam and to the student of economics it is full of vital and vitalizing significance. Undoubtedly the scientific agriculturist long ago realized much, if not all that is therein implied. To reach the sentient ear of the man in the street, however, required the sense-compelling voice of such a one as Theodore Roosevelt. Ably supplementing the patriotic advice of our ex-president we have for years heard from the peaks of the Rocky Mountain quite as trenchant words backed by amazing statistics from an equally typical and vigorous American, James J. Hill.

History, ancient and modern, is full to overflowing with unanswerable data as to the dire results which come to the peoples who neglect the soil from which all wealth flows. Contrawise, but little study is needed to disclose the secret of vigorous and enduring national life for all those peoples who are closely attached to the soil. Coincident with this awakening of ours as to the need of increasing crop average, there has been blazoned forth another beacon to urge and lure us on and that is—efficiency.

Just as a Hill or a Roosevelt was necessary to concentrate the minds of the multitude upon the faults, the advantages and the potentialities of the farm, so there was lacking for many years, a voice and an incident of such far reaching force as would quicken into action the hidden or slumbering thoughts of the nation on this very question of efficiency in every act and walk of life from the plow to the pulpit. Such a voice and incident challenged public attention when lawyer Louis D. Brandeis of Boston appearing in behalf of the shippers before the Interstate Commerce Commission charged and admittedly proved on the authority of Harrington Emmerson and other efficiency engineers that the railroads of the country by the application of scientific management could effect economies in excess of a million dollars per diem. If, then, we are constrained and adjured to turn our economic steps again toward the farm, no less certainly and insistently must we efficiently proceed there, produce there, and distribute from there the fruits of the soil which constitute the very bones and sinews of our country.

The fact is now pretty well recognized in the world of manufacture, trade, transportation and even finance that the day of small scale business and even of competitive business is rapidly passing away and it may not be amiss for the scientific agriculturalist to at least take a survey of the conditions which now obtain and which within a limited period of our national life, are bound or at the very least are liable to obtain upon the farm. Never in the world's history could it be more truly said no man lives or can live, to himself alone. In all our doings and dealings we are so intimately and inextricably bound together that speaking within reason, no longer does one spin for himself alone but he is, as it were, merely one of the countless spindles in the Gargantian loom of our national life.

The obvious function of the agricultural educational institution is to transmit to the rising generation the crystallized and selected and specialized knowledge concerning the farm which their elders have culled from the centuries. To see that this "vade mecum" for the farmer has assumed most imposing proportions already, one has merely to glance at the array of departments of instruction conducted under the Directorship of Dean Bailey of the New York State College

of Agriculture at Cornell University. The budding agriculturalist is trained in almost every branch of agricultural activity. Clearly it would be little short of folly for the specialist, however highly trained in other walks of life to offer to the scientific offspring of Dean Bailey, et al, mental pabulum, however predigested or technical, concerning the esoteric Buddhism of raising hay or chickens, for, evidently, the resultant efficiency of the man behind the hoe is now or must hereafter be of a very high order.

The industrial efficiency of Harrington Emmerson, Frederick W. Taylor and their followers, like charity is an all embracing term which, when sifted down into library parlance, might be specified as "attainable perfection." Perfection or 100% industrial efficiency, man will never attain. Yet our Doctor of the Farm might grow seedless pippins which tempt all the sons of Adam to violate hitherto unviolated decalogues of the Doctors of Medicine, yet fall far short of the individual and collective efficiency which they must attain if we of this day and generation are to solve the grave economic problems which the moving picture machine of the daily press is projecting on the curtain of our attention. Efficiency on the farm must not and cannot be satisfied with mere technical successes but the infusion into its work of a broad patriotic spirit, will go far toward solving the problems which are common to the whole people.

Just as all wealth is produced solely from the soil by the sweat of man's brow, so its consumption or enjoyment inevitably involves distribution and exchange which clearly at present are outside the agriculturalist's domain, yet are so intimately bound up in the warp and woof of our every day life that the price of eggs—without a too great stretch of economic imagination might yet produce a panic. In the very nature of things, the farm and farmer of yesterday represented the quintessence of individualism. The orchard and the pomologist of the new era are and must be frictionless cogs in the great industrial mechanism of America if she is to keep step with progress, if she is to feed efficiently and equitably her teeming millions and if she is to hold high her head in the court of commerce of the world's best nations.

It will scarcely be questioned that the work of the farm tomorrow will chiefly be performed by mechanical power at least if profits and efficiency are to be secured. The self interest of the farmer is self preservation which translated into work-a-day language is the production of profits or the earning of wages or salary or the maintenance of self and family and farm. The farm of tomorrow (to be efficient, to be profitable) must have ample capital to conduct it in common with the bulk of other commercial and manufacturing industries. The transportation of farm products demands efficient highways both on the farm and to the railroads. The agriculturalist must jointly or severally or through the county, state or nation procure such highways or let bumper crops rot on the ground while millions clamor for them a hundred miles away. When transported to the shipping destination the products of the farm must be distributed to the ultimate consumer profitably to the shipper and efficiently—quickly and economically—to the buyer. That this is scarcely the case today can be seen in the fact that of every dollar paid by the ultimate consumer, the farmer receives less than one-half. The Grange associations, joint stock companies, coöperative societies, common markets and kindred organizations into which the farmer may weld and merge his individuality without losing it (just as do other producers), unmistakably point the way to the goal of high efficiency on the farm—and not otherwise.

Let the rising generation delve into modern economies as deeply as he does into soil technology and he should then be able to adjust himself and his interests to the tidal industrial forces all about him which evidently he at present ignores or fails utterly to comprehend.

AQUATIC FARMING

By Wallace H. Hook, '12

LIMNOLOGY is the study of water biology and includes all aquatic life, animal organisms from whales to paramoeciums and vegetative life from the largest plant down to the smallest algæ. Let us take up briefly an economic side of limnology which may be termed aquatic farming and which will deal with commercial fish raising, not with the idea of telling how to produce fish commercially with a profit, for that has not yet been determined, but to give an idea of what progress has been made in regard to a coming industry.

The hatching of fish has been worked down to a comparatively easy science. Most of the fish may be stripped of their spawn and those which do not yield their eggs to this operation can be induced to lay the spawn where it may be easily gathered. The great question now to be solved is the feeding of the fish. The method now used is to throw into the fish pond quantities of ground liver, not the natural food of the fish but an artificial substitute. This is not profitable. Moreover, it is taking from the land to feed the water, when in truth the water is a great deal more productive. Therefore, the effort which has been and is being made is to produce the natural food of the fish in the water in such quantities that a great many fish may flourish where a few now survive.

This work should have been carried on by the Fish Commission but up to the present they have been satisfied with hatching fry and dumping them in large numbers into the lakes and streams, a proceeding as foolish as turning 100 cows into a one acre lot and expect them all to subsist on the scant supply of food. It is small wonder that the fish become cannibals and the big ones eat up the little ones. But the credit for the advancement made thus far is almost entirely due to the Limnology Branch of the Entomological Department under Dr. Needham and Mr. Embody with the aid of a few personal workers.

The first thing that these workers determined was the diet of the fish. We may watch a cow eat hay, grass, corn-fodder and a mixed grain ration and know that these substances form a large part of the diet of all cows but we cannot watch a fish eat in the wild state. It is necessary to catch the fish and identify the contents of their stomachs. This has been done so that now the chief articles of diet of some of the important varieties is known.

The species examined were found to be almost entirely carnivorous. Therefore, the abundance of small aquatic plants and vegetative organisms in the shoal waters of our lakes and streams is of little direct value as food for the fish. However, the investigators determined that the fish devours as food certain aquatic animal organisms which do use the small aquatic plants as food. Here we have two important discoveries. First, that the fish is a carnivorous animal, second, that the carnivorous fish feeds on the small aquatic animal organisms which in turn feed on the easily produced supply of vegetable organisms.

The next step was to select from the countless number of small aquatic animal organisms those which were most valuable as food for fish, which reproduced in the largest numbers, which matured rapidly, whose production was most continuous and which in a measure could be domesticated. After extensive searching and tireless experimenting, from the countless number of aquatic organisms a few important kinds were sifted out among which two kinds have been given special attention as promising food for fish. They are the fresh water shrimps and the larvæ of one of the mayflies. Of the two the mayfly larva is the most promising. The single adult mayfly lays about 1000 eggs at a time and a complete generation matures in from

Courtesy of the Department of Biology

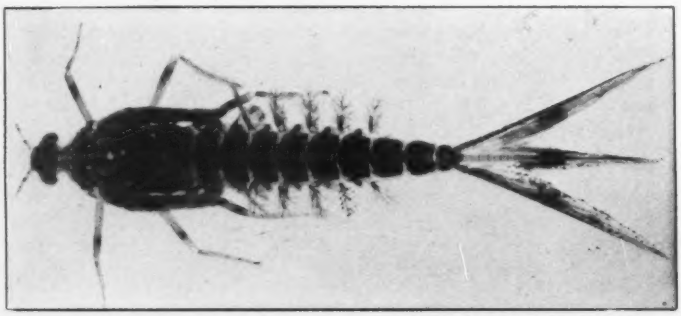
FIG. 1.

One of the staple forage crops of inland waters. A "fresh water shrimp," *Gammarus fasciatus*. Of great hardiness, but of rather slow increase.

five to six weeks, while the shrimp requires the same length of time to mature and only lays twenty eggs at a time. However, the mayfly is the more difficult to handle for when the insect matures from the larva state, it leaves its water abode, rising above the ground to gather in swarms. Then, the insect seems to require that it fly up and down in this swarm before it mates and settles to the water to lay its eggs. In this mating flight which lasts a couple of hours, an ample opportunity is presented for the swarm to drift away and light in a different locality from that intended. Thus, it is necessary to build large screened enclosures to confine the fly to the locality desired.

But both the mayfly and the larva must be protected during the hatching and maturing seasons from the ravages of the fish. The fish pond and the food pond must be separate. Moreover, although the fish pond may be small, the food pond should be large. The reason for both these facts must be obvious.

The ideal aquatic farm as now determined is a small inclosed pond of



Courtesy of the Department of Biology

FIG. 2.

A new crop being raised at the C. U. Biological Field Station, a may fly nymph, *Callibætis fluctuans*, a choice fish food, of enormous reproductive capacity. The offspring of a single pair during one season may number 125,000,000,000.

fairly deep spring water for the fish surrounded by a relatively large inclosed area of shallow water for food production, from which the supply of fish food can be let into the pond for the fish as desired.

Just how this ideal condition is to be secured is yet to be determined. Scientific investigation up to this point shows that some day in the near future, aquatic farming will be carried on practically and profitably. So far the information is almost entirely of a scientific and experimental nature but as rapidly as time and the scant funds available for the work will allow, the limnology corps of investigators are stripping the procedure of unnecessary incumbrances of all kinds, and are putting it on a practical basis with practical methods. In their quiet way, they are making splendid progress toward this end.

Although aquatic farming holds forth no immediate large financial returns, as a direct calling, or along with agriculture it promises a most interesting occupation and an almost certain ultimate success.

FROM THE SECRETARY'S OFFICE

Some statistics regarding the students who matriculated in the College in September have been tabulated by the Secretary of the College from which many interesting facts may be deduced. First, the number of women students is about one-eighth of the total matriculated. Second, the students from New York State number a little over two-thirds of the total. Third, the densely populated districts and the sparsely populated districts are sending more students than the intermediate districts or small sized towns. Fourth, though a great many students come from densely populated districts, yet approximately three hundred of the four hundred and eight matriculated have had practical farm experience. The statistics follow:

	Reg.	Sp.	Totals
Number of men	274	84	358
" " women	40	10	50
" " students from New York State	237	73	310
" " " " Other States	70	17	87*
" " " " Foreign Countries	7	4	11*
" " " " places in N.Y. State of over 10,000 inhabitants	121	25	146
" " " " places in N. Y. State of over 5,000 inhabitants	14	2	16
" " " " places in N. Y. State of over 1,000 inhabitants	49	11	60
" " " " places in N. Y. State below 1,000 inhabitants	53	35	88
" " " who pay tuition	62	15	77*
Average age	19	23	21
College Degrees:			
M.S.		1	1
M.F	1		1
A.B.	8	3	11
B.S.	5	2	7
Ph.B.	1		1
Number of College graduates	15	6	21
" " students who have attended College but did not graduate	54	20	74
" " " " in Winter-Courses in Agricultural Colleges		4	4
" " Commercial School students	1	1	2
" " Normal School students	6	2	8
" " Military Academy students	1	1	2
" " High School students (all or part of course)	237	53	290
" " Grammar School students		1	
" " Union School students		4	7
" " District School students		2	
" " students who have had practical farm experience	196	83	279
" " " who have had no practical farm experience	73	8	81
" " " who did not state their farm experience	45	3	48

*The discrepancy between the number of students from other States and Foreign Countries (98) and the number of students who pay tuition (77) is due to the fact that eight hold non-resident scholarships; three withdrew; two transferred to the Graduate School; four Foreign students are now residents of New York State; four other students were relieved from paying tuition as they are now residents of New York State.

The Cornell Countryman

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MARCH, 1912

The Action of the Students' Association

The support and appreciation which the students and alumni of the College would give to Dean Bailey in his efforts directed toward the betterment of country life and in his work of reorganization of the College of Agriculture, were manifested by a set of resolutions unanimously adopted by the Students' Association at its annual meeting, February 21, 1912. The resolutions are as follows:

"Whereas, agricultural education is growing rapidly through many agencies, the effectiveness of which we think can be increased by the coöperation of former students of the College of Agriculture;

"And whereas the development of agricultural education in this country has had the faithful service, impartial counsel, and unequaled leadership of that foremost agricultural educator, our own Director Bailey;

"And whereas Director Bailey has stated that he will remain without reservation to help work out the new administrative plans for the College and the educational policies that necessarily are to establish themselves on these plans, and that he wishes that the Agricultural Council, Faculty, Alumni, and others might determine when such plans are in effective operation.

"Be it *resolved*,

"First, that we, the former students of the New York State College of Agriculture, individually and collectively will aid the extension of agricultural education by furthering the introduction of agriculture into rural schools and high schools, and by aiding in the establishment of extension schools, coöperative experiments, and farm demonstrations.

"Second, that we pledge to Director Bailey our earnest coöperation in the solution of these educational and administrative problems.

"Third, that this progress can be best effected by the gradual organization of local or county units.

"Fourth, that a committee of twenty-five, with power, representative of the United States as to location and the College as to course and class, be appointed by the President of this Association with the approval of the Executive Committee, whose duty it shall be to coöperate with Director Bailey in the development of the College of Agriculture and in the promotion of agricultural education.

"Fifth, that we commend the plan proposed by Director Bailey for the administration of the College of Agriculture, and that we express to the Trustees of Cornell University our gratification at their unanimous adoption of the plan.

"Sixth, that this action be trans-

mitted to the President of the University, to the Director of the College, to the Trustees, to the former students of the College of Agriculture, and to the press."

This hearty response to the call for unified action and unselfish coöperation in directing the dissemination of agricultural education is most gratifying. It means that the members of the Students' Association, the present and former students of the College, have pledged themselves to unite under the leadership of Dean Bailey in order that the spread of agricultural information may be more rapid and certain. With such a force at work, we see bright prospects for the education of the farmer of to-morrow.

Coöperation

It is a strange fact, that, although the American farmer as a class represents a larger monied interest than any other class of the people in the United States, yet they are, except in a few rare instances, unable to control the prices on either their productive or their consumptive goods. The reason for this, is that to a large extent the farmer acts almost entirely as an individual, whereas the urban population represent a high type of organization and act as a class.

It is even harder to understand why the American Farmers have not organized when we have such splendid examples of successful coöperation among the farmers of Europe in the coöperative societies and the coöperative banks, especially in Germany and Denmark.

The comparatively few examples of coöperation in this country have for the most part been successful and we hope will start the movement going. Most of these societies are in the West, and we wonder how much longer the farmer of the East must ask when selling his products: "What will you give?" and with equal dependence have to ask in buying: "How much do you ask?"

We were specially fortunate in securing for our readers several articles for this number which touch on organization and coöperation.

The Student Room

For a long time there has been a crying need for a student lounging room in the College of Agriculture like the ones in Goldwin Smith and Sibley. The Student Association needed a place to hang its athletic banners and pictures while the men needed a place where they could spend the time between their classes.

This need was first supplied by the seminar room across the hall from the library. As this room was never large enough a larger room was asked for. Until the beginning of this year, there has been no available place. This year, however, Dean Bailey offered the basement laboratory of the pomology department. He also offered to fit it out according to plans submitted by the Association.

A committee was given the work of forming plans and carrying them out. Benches were placed around the walls, two large tables and a good supply of chairs were furnished, and the trophies moved into the room.

At the winter election of officers for the Association a vote was taken on the question of smoking in the new quarters. The students came out with a large majority against smoking.

Now there is abundant room for all who wish to study, read, or rest between classes. The room is also an ideal place for the athletic trophies and pictures. Class and club meetings are being held in the room and there is movement on foot to have some get-together meetings there in the near future.

B. H. AUSTIN, '12

Farmers' Week

A record crowd of interested visitors gathered at the College of Agriculture to attend the fifth annual Farmers' Week, Feb. 19 to 24, and the capacity of the college was taxed to the utmost to accommodate the guests. The congestion in the main building was increased by the condemnation of the Animal Husbandry Building which was declared unsafe on account of the condition of the roof.

The program of the week was so arranged that a definite and connected line of work could be followed throughout the week, such as lectures and demonstrations on dairying, poultry raising, fruit growing, farm crops, and the like; or a man might devote his attention throughout the entire week to the economic, social and educational questions of rural life. There were over 300 lectures, fifteen exhibits and fifteen conferences, allowing a wide range of choice for visitors.

The program of conference and conventions held during the week was as follows: The New York State Drainage association (Monday, Tuesday); Homemakers' conference (throughout the week); Poultry institute (Tuesday-Friday); Rural Church conference (Tuesday); Students' association of the New York State College of Agriculture (Wednesday); New York State Vegetable Growers' association (Tuesday-Thursday); New York State Plant Breeders' association (Wednesday); Winter Dairy Students' association (Tuesday); Rural Bankers conference (Friday); Rural Editors' conference (Wednesday); Experimenters' league (Thursday); and Rural School Education conference (throughout the week).

Another feature of the week were the exhibits arranged by the various departments. Among these were The Animal Husbandry exhibit; the exhibit of Dairy Industry showing bacteria and their relation to clean milk; the Farm Mechanics exhibit of water systems, lighting plants, spray machinery, and gasoline engines; an exhibit of the home economics department including charts and labor-saving devices; an extensive exhibit showing the improvements of plants by the plant-breeding department; demonstrations and exhibits of plant diseases and insect pests; demonstrations and exhibits relating to floriculture and vegetable culture; an educational exhibit of poultry house appliances, with charts and photographs showing the results of recent investigations; exhibits showing the forms of lime, fertilizer materials, drainage and irrigation systems; exhibit of students' work of the department of Rural Art and drawing.

Parcels Post

Monday, March 18, 1912, is being broadly heralded as Farmers' Parcels Post Letter Day. On this date all the farmers are requested to write to their members of Congress stating their demand for parcels post. Let every reader of the COUNTRYMAN write such a letter and try to persuade your neighbor to write also.

CAMPUS NOTES

CALENDAR

Mon., Mar. 11,	Round-Up Club.
	Lazy Club.
Tues., Mar. 12,	Association Meeting.
Mon., Mar. 18,	Round-Up Club.
	Lazy Club.
	Sophomore Ag. Class Meeting.
Mon., Mar. 25,	Round-Up Club.
	Lazy Club.
Mon., April 1,	Round-Up Club.
	Lazy Club.
Wed., April 3,	Spring Recess Begins.
Tues., April 9,	InstructionResumed.

* * *

The regular February Assembly was held on Thursday evening, Feb. 15, After the regular opening by singing the "Alma Mater," musical selections by the Glee Clubs were enjoyed. A powerful and inspiring address by Dean Bailey followed. He discussed the relation of the individual to the world at large, bringing out the fact that the individual must place himself in the right attitude with regard to his fellow men if he is to reach the utmost usefulness. The Dean read a portion of Robert Louis Stevenson's "Will o' the Mill," to illustrate the effect of an over-segregated life. The evening was closed with the singing of the "Evening Song," after which all remained to join in the usual social hour.

* * *

At the fourteenth annual banquet of the Cornell Club of New England at Boston, Feb. 10, Dean Bailey, the guest of honor, spoke of the University's future. Byron Satterlee Hulburt, of Harvard, paid a high tribute to Cornell and Dean Bailey, for the Cambridge institution. Coach John F. Moakley and the track squad were also present and carried greetings from Ithaca.

* * *

Samuel Campbell was one of the first trustees of Cornell University, a friend of Ezra Cornell, and together with Mr. Walcott owned at one time the greatest herd of Shorthorn Cattle in the country, the New York Mills Herd. This herd sold at auction September 10, 1873. One cow, the Eighth Duchess of Geneva brought $40,600, which was a record price at that time for an animal of any description.

Mrs. Jane Coventry, a daughter of Samuel Campbell, has presented to the College of Agriculture through her son, Mr. Sinclair Coventry, a member of the Winter Course, two very interesting and valuable historical pamphlets. One is a catalogue of the New York Mills Herd, March 1, 1873, and the other is a sale catalogue containing the prices and names of purchasers at the New York Mills Auction. Besides these, she has presented a beautifully framed collection of medals won by the herd at the New York State fair. The College and especially the Department of Animal Husbandry appreciates the fact that the Campbell family has placed them here.

* * *

Miss Mary A. Fitch, graduate student in plant physiology and entomology during 1909–10, has returned to

continue her work for the doctorate. Miss Fitch is now assistant plant pathologist at Purdue University.

* * *

Professor Fippin of the Department of Agronomy, on Feb. 7, lectured at Columbia University, on "Practical Farm Drainage." This lecture was one of a series of sixteen lectures, given on Wednesday afternoons by some of the most learned men of the country.

* * *

The Juniors held a smoker in Barnes Hall on the evening of February 16th. This is the first time that the Ag. Juniors have ever held such a function and in spite of the fact that a Wrestling Meet and a Masque performance were being held the same evening, the affair was so successful that such a get-together bids fair to become an annual event. The committee in charge deserves much credit for the excellent program which they prepared. Prof. Mann was the table toastmaster; stunts were given by Messrs. Horner, Whitney, Rothstein, Genung and Van Hoesan and Profs. Mulford, Gilbert and Whetzel entertained with talks and stories.

* * *

The Poultry Department has been very active in extension work during the last month. Professors Rice, Trask, Hurd, Krum, Rogers, and others have given numerous stage exhibits and speeches all over the state. Great interest was shown in these meetings.

* * *

Mr. H. J. Sconce, a corn breeder from Illinois, visited the Department of Plant Breeding during February and gave a talk before the Synopsis Club on the 8th of the month.

* * *

Synapsis held its one-hundredth meeting on the evening of February 14. The meeting was held at the home of Dr. Webber and the occasion duly celebrated by an appropriate program.

* * *

Professor Fippin recently wrote an article on "The Agriculture of New York State," which was printed in the March number of the *Journal of Geology*, published at Madison, Wis.

* * *

The Department of Farm Mechanics recently received a large amount of new equipment, a considerable part of which deals with different kinds of water supply systems.

* * *

Mr. Oliver Wilson, of Peoria, Master of the National Grange, addressed local grangers and undergraduates of the College of Agriculture, Feb. 9.

* * *

Mr. Leighty of the Department of Plant-Breeding attended the Farmers' Institute recently held at the Lincolndale Agricultural School.

* * *

Dr. Gilbert gave several lectures in the Institute School Series during February.

* * *

J. K. Wilson is dividing his time between soil technology and plant physiology.

* * *

R. E. Deuel, '11, instructor in Animal Husbandry, is in charge of the operation of two new vacuum milking machines which were installed recently in the Agricultural Barns. One o these machines will milk two cows at the same time and in about one quarter of the usual time required.

* * *

Professor Fippin in connection with the Western Pennsylvania Farmers' Week of the State College of Agriculture, on March 4th and 5th, lectured on Soil Moisture and Drainage, at Greenville, Pennsylvania.

* * *

Dr. Gilbert spent the first week of February giving talks at Farmers' Institutes on Long Island, speaking at Northport, Bridgehampton, Riverhead and Southhold. He also gave talks at meetings of the rural teachers of Suffolk County under the auspices of the State Department of Education.

The department of bacteriology of the State Experiment Station (Geneva) is now represented at Cornell by two experienced investigators, registered in the Graduate School. M. J. Prucha, fellow in plant physiology, is conducting important investigations relating to the nitrogen-fixing bacteria of legumes.

* * *

The Ag. basketball team closed the season by defeating C. E., on Saturday, Feb. 17. This left the team in the third place for the inter-college basketball series. The line-up was as follows: E. A. Brown, right forward; M. E. Maxon, left forward; N. D. Steve, centre; D. D. Ward, (capt.) right guard; R. F. Steve, left guard; substitutes, T. M. Gray, C. G. Crittenden, J. A. Webb; manager, W. De S. Wilson. The team met Feb. 18, and elected the following officers for the year, 1912–13: Captain, N. D. Steve; manager, J. S. Clark.

BASKET BALL TEAM, 1911–12.

Photo by Robinson

W. De S. Wilson, Mgr., C. G. Crittenden C. S. Wright, Coach

R. F. Steve D. D. Ward, Capt. E. E. Brown

M. E. Maxon N. D. Steve

FORMER STUDENTS

MAURICE CHASE BURRITT.

'08, B. S. A.; '10, M. S. A.—Maurice Chase Burritt was born and reared on a farm at Hilton, Monroe County, New York. He received his early education at the Hilton High School, and at Genesee Wesleyan Seminary at Lima, graduating from the latter institution in 1902. He early determined to seek an agricultural education at Cornell, but owing to the death of his father when he was quite young, the management of the home farm devolved on him. After his graduation from preparatory school therefore, he spent two years reorganizing the farm, getting it into profitable enough operation to provide for his college education.

Entering Cornell in 1904, he graduated in 1908. While in college he was connected with many student activities, being a member of Hebs-Sa, President of the Agricultural Association one term, and Alumni Editor of THE CORNELL COUNTRYMAN in his senior year. He was also a student assistant in "Farm Crops" during his last term, and is the author of Cornell Bulletin 271, "The Incomes of 178 New York Farms."

After graduation he assisted in making an Orchard Survey of Monroe County. On September, 1908, he entered the Office of Farm Management, in the United States Department of Agriculture as a Scientific Assistant in Farm Management. For three years he was engaged in "district" field work mostly in New York and the New England States, being promoted to Assistant Agriculturalist in 1910. He has written several bulletins, two of which "Agricultural Conditions in Southern New York," and "A Successful New York Farm," are published, the others not yet being in print.

During the winters of 1909–10 and 1910–11, Mr. Burritt taught the Short Course in "Commercial Fruit Growing" at Cornell.

In October, 1911, Mr. Burritt resigned from the Department to become editor of the *New York Tribune Farmer* at New York City in which work he is now engaged.

He has just completed a book on "The Farm Apple Orchard" which will soon be issued by the Outing Publishing Company.

Mr. Burritt still owns the home farm, "Beechwood" which he operates at long range through a manager and in which he is very much interested. He has always looked forward to returning to it but so far the inducements of a larger field of usefulness have not permitted this, although he has not abandoned the hope of some day settling down there with the orchards he is developing.

On August 9, 1911, he was married to Estella May Buell of Bergen, N. Y.

'94, B. S. A.—Raymond A. Pearson, who resigned the office of Commissioner of Agriculture of the State of New York, last week said in his letter to Governor Dix: "For a long time I have wished to make a study of certain agricultural conditions in Europe, and I have decided to undertake this study at an early date." In accepting the resignation, the Governor commended

Mr. Pearson for the service he had rendered the State since his appointment in April, 1908, and for his determination to take up the study of agricultural conditions abroad.

'00, Ph.D.—Dr. Judson F. Clark and Pery Lyford, '06, B.S.A., are now associated in the lumber business in Vancouver, British Columbia. They also have an eastern office at Montreal.

'02, B.S.A.—L. H. Moulton, who formerly has been on a farm near Cuba, N. Y., has accepted a position as Superintendent of the College Farms.

'03, W.A.—Hubert D. Gage, of South Berlin, N. Y., is in charge of Governor Dix's farm near Albany.

'04, F.E.—Louis Margolis who has been in the United States Forestry Service, is now Forest Cruiser with the firm of Clark & Lyford. He is located at Montreal, Canada.

'04, W.A.—C. E. Holloway has resigned his position as superintendent of the Pencoyd Farm, Bala, Pa., and will start in farming for himself. His address is R. D. No. 3, Morristown, Pa.

'05, M.S.A.—C. I. Lewis is chief of the division of horticulture at the Oregon Agricultural College and Experimental Station.

'05, B.S.A.—Robert Dunlop has purchased a farm at Wyebrook, Chester Co., Pa., on which he will put into practice the up-to-date methods he learned while in college.

'06, B.S.A.—F. E. Peck writes from Chattanooga, Tenn., that he has been acting as bacteriologist and chemist for the Hill Dairy Co., located there. After leaving college Mr. Peck taught two years at the Mt. Hermon School, Mass. The two years following he had charge of the certified milk plant of the Fairchild Dairy Co., at Montclair, N. J. He gave up this position to go to Chattanooga, where he has been working in a well-equipped commercial plant. Mr. Peck has recently contributed articles on dairying to some of the leading agricultural papers. He is also a weekly contributor to one of the local papers. His address is 1117 E. 8th Street, Chattanooga, Tenn.

'07, B.S.A.; '08, M.S.A.—N. H. Grubb is in the Forestry Service of the United States Department of Agriculture. His address is 1939 Biltmore Street, Washington, D. C.

'07, Sp.—Henry Jennings is a soil scientist with the United States Department of Agriculture and at present is located in Gwinnett County, Georgia

'08, M.S.A.; '09, Ph.D.—J. O. Morgan, formerly professor of agronomy at the Mississippi Agricultural and Mechanical College, has assumed the duties of professor of agronomy at the Texas Agricultural and Mechanical College, College Station, Tex.

'09, B.S.A.—Rolla C. Lawry, manager of the Yesterlaid Egg Company, Pacific, Mo., has recently been married to Miss Estelle Irene Campbell of that place.

'09, B.S.A.—S. F. Willard, Jr., is with Vaughn's Seed Store, Western Springs, Ill.

'10, B.S.A.—C. C. Vincent who was Assistant in Horticulture in the Idaho Agricultural College has accepted a position in Clemson College, South Carolina.

'10, B. S. A.—F. B. Kelley will go to Clifton Springs, N. Y., on March 15th, to manage a farm recently acquired by his employers, the Jackson & Perkins Company, wholesale nurserymen.

'10, W. A.—Carl J. Taber is foreman of the Otsego County Farm at Phoenix Mills, N. Y.

'10, W. P.—Ford W. Arnold is building up a poultry farm in Otsego County, at West Oneonta, N. Y.

'11, Ph.D.—George Bouyoucos is now connected with the Soils Department at the Michigan Agricultural College.

'11, Ph.D.—F. K. Harris is now Professor of Agronomy at the Utah Agricultural College.

'11, B.S.A.—T. E. Elder was recently a visitor at the college. Mr. Elder is at the head of the agricultural department of the Mt. Hermon Preparatory School, at Mt. Hermon, Mass.

'11, B.S.A.—Joseph Retick is engaged in fruit growing at the Royal Ridge Farm, Front Royal, Virginia. Roy B. Holbrook, '10, and Lawrence Swan, '11, are in partnership with him. "All Cornellians welcome."

'11, W.A.—Henry D. Knight is spending the winter at Palm Beach, Fla., where he is engaged in packing and shipping citrus fruits.

'12, Ph.D.—John Turlington is now Assistant Agronomist at the Georgia Agricultural College.

'12, B.S.A.—Lester A. Polhemus was married to Miss Jessamine Warwick at Brockport, N. Y., on February 6th. He has accepted a position as manager of the Northfield Farm, East Northfield, Mass.

'12, B.S.A.—S. N. Stimson recently accepted a position as farm manager on C. G. A. Whitney's farm, near Albany, N. Y.

'12, Sp. Ex.—D. E. Smith, who had to leave college during the middle of last term on account of poor health is at present at Saranac Lake, N. Y. His many friends here wish him a speedy recovery.

'12, Sp.—R. T. Leader is employed by Charles T. Stout on a 300 acre farm in Connecticut devoted to fruit and stock raising.

'12, W. H.—Ellwood Douglass has a position on a fruit farm owned by Geo. C. Hubbard, at Red Hook, N. Y.

'12, W.A.—Alexander B. Borgeson has accepted a position with the Atlas Portland Cement Co. He will be in charge of between 5,000 and 6,000 acres in New York, New Jersey, Pennsylvania and Missouri. He is located at North Hampton, Pa.

* * *

We should like to publish a note for each former student at least once each year. We cannot do this without your coöperation. Will YOU give it?

POSITIONS

[*Below are given a few available positions which have come to the College. For further information address Prof. J. L. Stone at this College.*]

Farm of 116 acres in Dutchess Co., N. Y., devoted chiefly to dairying. Farm furnished with stock and machinery, also a silo. Will rent on shares or pay a small salary.

* * *

Moderate sized farm in Connecticut devoted to dairying, vegetable, and flower gardening (greenhouse). Married man wanted.

* * *

Dairy farm of 130 acres, 26 miles from Buffalo, for rent on shares. Silo, ice-house. A married man required.

* * *

Country place of 125 acres in Connecticut, 35 miles from New York City. Requires a married man 25 to 40 years old experienced in poultry, cattle, fruit, vegetables, flowers, and lawns. Small greenhouse for starting plants.

* * *

A working foreman for a moderate sized farm in Chenango Co. Chiefly dairying. Cottage, fowl and milk supplies.

* * *

A Pottsville, Pa., gentleman desires a man to work a 40 acre farm and manage a tract of mountain land of some 1200 acres on which it is desired to keep goats for milk for hospitals. About 225 goats are now on the place. Single or married. Man must have had some experience with goats.

* * *

Farmer for Home for Children near Philadelphia, Pa. Wife to act as matron. Sixty-eight acres of good land. Inmates 60 children and nine old men. Start at $900 per year with advance of $100 per year for three years. Furnished rooms and board.

* * *

Farm for rent on shares, three miles from Canandaigua, N. Y., on trolley line. Adapted to milk business.

GENERAL AGRICULTURAL NEWS

The Fertilizer Resources of the United States

The United States possesses the largest phosphate fields in the world and not only supplies all that is required for home consumption but also exports large quantities to foreign countries. All of the potash, however, required for our fertilizers is imported from Germany, the annual importation being about $15,000,000.

Germany has shown a disposition to limit the amount sent to this country and as the use of fertilizers is increasing rapidly, the need for a home supply becomes every year more apparent.

The Department of Agriculture has been investigating the possible sources of potash in this country and now reports this country should shortly not only be able to supply its own needs of potash salts, but even possibly export to foreign markets. A new industry will be established and if the by-products are wisely used many millions per annum should be added to the wealth of this country.

The Department experts have covered a wide range in their investigation. Some of the desert basins were examined; brines and mother liquors from salt wells were tested and experiments were carried on with the object of extracting potash from silicate rocks and minerals, such as alunite, which contain it. The work is still under way and potash in limited amounts undoubtedly will be derived from some of these sources. Up to the present, none of inorganic sources give promise of satisfying the country's needs.

But in the giant kelps of the Pacific Coast a satisfactory source of potash has been found. The kelp groves along less than one-fourth of the coast-line have been mapped and yet these should yield from two to three times as much potash as the present importations. These sea weeds are able to extract, by selective absorption, the potash salts from the sea water and on drying, these salts are very largely exuded on the surface. The dried plants contain from 25 to 35 per cent. of their weight of potassium chloride and the latter can very readily be extracted. The kelps also contain iodine and many other by-products can be obtained from them. It is possible that these by-products will more than pay the manufacturing expenses, leaving the potassium chloride free from cost. The Japanese have already shown considerable ingenuity in working up these by-products. Not only do they use some of the waste material for cattle food but the Japanese themselves use it as staple article of diet. Glue, shellac, paper and other useful by-products can also be obtained from this source.

Some of the Pacific groves are five miles long and two miles wide, and the growth in these groves is exceedingly dense. These plants reach a length of 100 feet or more and grow in strong tideways where they are exposed to the full force of the open sea. All of the groves are within the three mile limit and should be easily harvested. If properly harvested and protected these groves will yield an annual harvest indefinitely; it is even possible that in some cases two such harvests may be obtained. On a conservative basis upward of a million tons of potassium chloride worth nearly $40,000,000 should be obtained each year. No estimate can be given at the present time of the value of the by-products.

Desiccated Potatoes

The drying of potatoes is an industry that has reached a high state of development in Germany, which country grows one-third of the world's potato crop. Germany has potato drying plants with a combined yearly capacity of nearly twenty-five million bushels of potatoes. The two general methods of manufacture are known as the roll system and the drum system.

In the roll system the potatoes are steamed until softened, and then passed between large revolving cylinders which are heated by steam. The

potato forms on the roll in a layer, which dries and is scraped off during the revolution of the roll. This product has the appearance of one of our breakfast foods known as "corn flakes" and is used as general substitute for the fresh potato in the household, in addition to being ground to a flour and mixed with other flours for bread making and in the making of cereal foods.

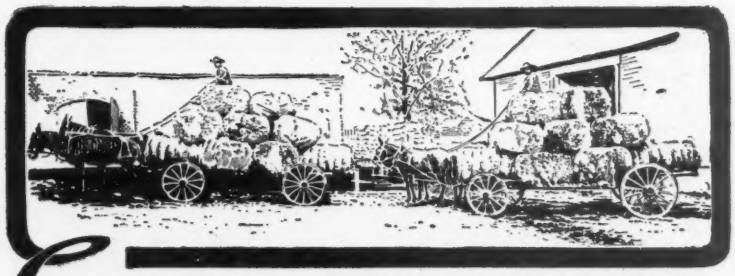
The drum system makes a product at about half the manufacturing cost of the roll system, and is used for all purposes other than human food. It consists essentially, of an iron shell about two and one-half feet in diameter and eight times this length. Through this a heavy current of air is drawn by means of a fan, and the fire gases from a stove feed directly into it, the mixture of heated and cold air being such as to make a temperature of about 60 degrees F. at the entrance. From a cutting machine, chipped potatoes are conveyed to the slowly revolving drum which is provided with an interior construction that gives the potatoes the maximum exposure to the drying action of the hot air. The drying operation must be done on rather a large scale, as small drums are not nearly so efficient in proportion to size. Four tons of potatoes yield one ton of dried product. In Germany, most of the product is used for domestic animals, having about the equivalent value of corn for farm stock. The product, being partially cooked, is most suitable for the manufacture of starch. One of the large manufacturers of machinery, is now trying out a process for making a material that will be suitable for making into finish starch.

It appears that this industry may be applicable to the United States, especially where the question of freight is one of importance for, as, seen above, the weight of product is reduced to one-fourth. It should enable our Western States to utilize the advantages they have for potato growing, both as a money crop and as a cultivated crop in the rotation to prepare land for wheat and other grains. Furthermore, the machines could be used for drying sugar beet pulp, beet leaves, and other similar products, as it is in this way the German beet sugar factories conserve their pulp, mixing it with a small quantity of molasses for stock feed, a part of which is exported to the United States.

* * *

A Parcels Post

It is an established fact that a special parcels post arrangement with our government enables the people of New Zealand to buy articles in the United States and have them delivered to their homes by mail cheaper than we can obtain the same goods from near-by cities by mail. New Zealand has a parcels post; the same is true of several other foreign countries. In other words, the American citizens are supporting a governmental department that is doing a large parcels post business benefitting only the people outside of the United States. We have learned, moreover, that under the supervision of the present postmaster-general the economical and efficient administration of the affairs of his department has turned an annual deficit of $17,000,000 into a surplus of several hundred thousand dollars. We know, too, that the officials of the Post Office Department are struggling over a problem, namely, how to use to the best advantage the extra room at the disposal of nearly all the mail carriers in the United States. And yet, the people of the United States cannot have a parcels post. Why? There are four reasons: the Adams Express Company, the Wells Fargo Express Company, the American Express Company, and the United States Express Company. Surely, the criminal prosecution of these companies about to be begun by the Interstate Commerce Commission because of their practice of overcharging the public ought to prepare the way at least for the establishment of a parcels post in the United States.



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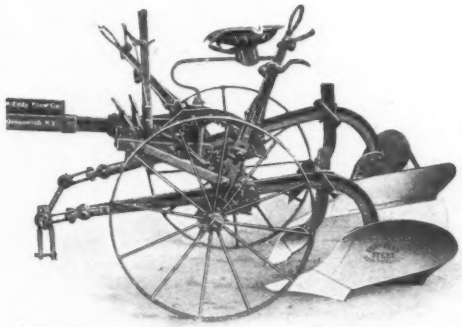

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